

REMARKS

Claims 1-6, 8-12, and 14-24 are pending in this application. Claims 1-6, 8, 11-12, and 14-24 stand rejected from the Office Action dated March 23, 2004 (the "Office Action"). Claims 9-10 have been indicated as reciting allowable subject matter. With this amendment, Applicants have canceled claims 23-24 and amended claims 1, 11, and 15.

Examiner's Interview

Applicants wish to thank the Examiner for the helpful Interview with Robert Stanley on May 13, 2004. As noted in the Interview Summary, the participants discussed the rejections under 35 U.S.C. § 112, second paragraph, and also the invention generally. The possibility of a Declaration under Rule 131 to overcome the cited Doyle reference was also discussed. Applicants respond to each of these discussion topics with the following remarks.

Claim Amendments

Applicants have amended claims 1 and 11 to recite an undiluted liquid kraft liquor stream. Support for this amendment is provided throughout the specification, for example, at page 5, lines 23-24. As a result, Applicants submit that this amendment adds no new matter and respectfully request that it be entered.

Claims 11 and 15 also contain amendments to correct certain typographical errors and conform these claims to the other pending claims. Applicants submit that these amendments do not add any new matter and request that they be entered.

Objections under 37 C.F.R. § 1.75(c)

Claims 2 and 12. The Examiner objected to claims 2 and 12 under 37 C.F.R. § 1.75(c) as failing to further limit the subject matter of a previous claim. Specifically, the Examiner interprets the term “probe” in the claims to refer to any kind of UV-ATR device (see Office Action at § 2).

Applicants respectfully disagree with the Examiner as to the characterization of “probe.” A probe is not any kind of UV-ATR device. The specification refers to ATR probes and flow cells independently, indicating that an ATR probe does not necessarily include a flow cell (see page 10, lines 18-20; page 12, lines 12-13 and lines 34-35; page 13, lines 22-23). In addition, the specification specifically distinguishes between an embodiment of an inventive system that uses an ATR tunnel flow cell (see Figure 1 and page 9, line 15 to page 10, line 2) and an embodiment that uses an ATR optical probe (see Figure 2 and page 10, lines 10-16). In fact, in the discussed embodiment an ATR probe is an ATR device “which is inserted directly into the targeting liquor tank, reactor, or process line” (page 10, lines 11-12). These differences in setup and operation between embodiments of the present invention that use either probes or flow cells reveals that the term “probe” does not encompass all UV-ATR devices.

The “attenuated total reflectance device” as recited in independent claims 1 and 11 properly recites a genus that includes a probe and flow cell as specific species (see original claims 11-12 and 14). Therefore, claims 2 and 11, in specifying that the device is “an ATR-UV optical probe,” properly limit the subject matter of the independent claim. While the Examiner suggests that a conforming amendment to claim 17 would cause claims 2 and 12 to become further limiting, such an amendment is not necessary given

the specific subject matter recited in their corresponding independent claims. As a result, Applicants submit that claims 2 and 12 in their current forms properly recite subject matter that further limits the claims from which they depend, and ask that the Examiner's objection be withdrawn.

Claims 23 and 24. The Examiner also objects to claims 23-24 under 37 C.F.R. § 1.75(c). With this amendment, Applicants have canceled claims 23-24, thereby rendering moot this objection.

Rejections under 35 U.S.C. § 112

Claims 11-12 and 14. The Examiner rejects as indefinite claims 11-12 and 14 under 35 U.S.C. § 112, second paragraph. Specifically, the Examiner believes "there is no structural connection between the liquid kraft pulp stream source and the rest of the elements of the system" (Office Action at § 3). Applicants have herein amended claim 11 to recite that the ATR device "is in direct communication with the undiluted liquid kraft liquor stream." The specification contains support for this amendment in at least page 10, lines 18-20: "any system which allows for contact between a process stream and an ATR probe or which generates process stream flow through an ATR tunnel flow cell is suitable for use in the claimed invention." One of ordinary skill would easily recognize that the process streams are in direct communication with the ATR devices discussed in those embodiments. As a result, Applicants submit that this amendment does not add any new matter and respectfully request that the rejection be withdrawn.

Claim 24. The Examiner rejects as indefinite claim 24 under 35 U.S.C. § 112, second paragraph. With this amendment, Applicants have canceled claim 24, thereby rendering moot this rejection.

Rejections under 35 U.S.C. § 103(a)

Based on Danielsson. The Examiner rejects claims 1-2, 4-6, 8, 11-12, and 16-17 under 35 U.S.C. § 103(a) as obvious over Danielsson in view of U.S. Patent No. 5,641,966 to Karlberg et al. and in view of Ley. The Examiner believes that it would have been obvious to incorporate the detection wavelengths of Karlberg et al. into the Danielsson device for taking spectroscopic measurements of process liquors because of Ley's teachings of hydroxide ion absorption and the ability to use regression calculations. Applicants respectfully traverse this rejection.

As noted by the Examiner, Danielsson does not discuss the absorption of species below 210 nm (see Office Action at § 5). The Declaration Under 37 C.F.R. § 1.132 of Xin-Cheng Chai dated October 10, 2002 (the "2002 Declaration"), previously submitted with the amendment dated October 22, 2002, states that the structure used in that reference is not capable of measuring spectral absorptions below 210 nm (see § 5, para. 2). Because carbonate ions absorb below this threshold value, Danielsson discusses only the hydroxide and sulfide ions present in pulping liquors, without any mention of carbonate ions (see, e.g., page 151, col. 2, para. 3). In fact, the reference determines only the individual concentrations for total salt, sulfide, and tetrasulfide (see page 155, col. 1; see also 2002 Declaration at § 5, para. 3).

The 2002 Declaration clearly indicates that the improvement of generating a spectrum below 210 nm allows for the calculation of independent hydroxide, carbonate, and sulfide ion concentrations (see section 5, paras. 1 and 2; section 6, para. 2). Karlberg et al., while alleging that absorbance data may be obtained from 190 to 820 nm, states only that the measurements may be performed using “fibre optics” (col. 6, line 43). The 2002 Declaration states that “it is well known that most fiber optics have very poor light transmission efficiency in the far UV range” (section 5, para. 3). Even though Karlberg et al. may suggest measurements across the entire UV range, it does not teach or suggest any device or method of generating accurate measurements below 210 nm, let alone those that overcome the lack of efficiency mentioned in the 2002 Declaration. In addition, the reference does not suggest using UV-ATR.

Further combination of Danielsson and Karlberg et al. with Ley does not add any pertinent teachings. Ley merely discloses that the hydroxide ion shows an absorption maxima at 1860 AU when using conventional UV spectroscopy. Figures 5 to 7 illustrate that Beer’s law does not apply to measurements taken with UV-ATR spectroscopy, and in particular of hydroxide ion in Figure 5. As a result, Applicants submit that one of ordinary skill would readily understand the absorption maximum for a given specie to be irrelevant when using UV-ATR.

To prove a *prima facie* case of obviousness, the Examiner must show that one of ordinary skill in the art would be motivated to combine the teachings of the three cited references with some reasonable expectation of success (see MPEP § 2143). While Danielsson may teach using UV-ATR spectroscopy to determine certain concentrations of pulping liquors, it is clearly not capable of generating absorption spectra below 210

nm. Even though Karlberg et al. mentions this range, neither it or any other cited reference suggests how to overcome poor transmission efficiency in the low UV range with its “fibre optics.” And Ley may teach the absorption maximum of hydroxide ion as below 210 nm, but it uses conventional UV techniques. Thus, even if one of ordinary skill in the art would be motivated to combine the three references in an effort to achieve the pending claims, there could be no expectation of success as none of the three references discloses how to generate a UV-ATR spectrum below 210 nm.

The specification discusses why ion concentrations are particularly beneficial in monitoring pulping process liquors: “High quality white liquor has high concentrations of NaOH and Na₂S, and low concentrations of Na₂CO₃ and sodium sulfate (Na₂SO₄). To control the pulping process, it is necessary to monitor and adjust the relative concentration of the major components” (page 4, lines 14-17, emphasis added). In the cyclical conversion from white to black to green and back to white liquor, each of the hydroxide, sulfide, and carbonate ions play an important role.

As discussed in the specification on pages 3 and 4, white liquor contains active hydroxide and sulfide ions to delignify cellulosic pulp. This spent white liquor becomes black liquor containing mostly sulfide ions, the burned ash of which is then dissolved in water to produce green liquor containing mostly sulfide and carbonate. Reacting the green liquor with calcium carbonate in water converts carbonate into hydroxide through recausticizing. As a result, knowing the individual concentrations of each of the species would be beneficial to the maintenance of the pulping liquors. If the relative concentration of carbonate is too high, then the green liquor may need further recausticizing or may need hydroxide and/or sulfide added. The individual component

concentrations may also be used to adjust the white to black or black to green liquor conversions, or adjust the amount of pulp introduced to the process.

Thus, determining multiple individual chemical concentrations of a pulping liquid would be particularly beneficial in optimizing the process to achieve better efficiency. While Danielsson may recognize this problem, it only achieves a part of the solution by determining the sulfide concentration. Total salt concentration is of no use, according to both the specification (page 5, lines 15-18) and the 2002 Declaration (section 5, para. 3). Karlberg et al. and Ley do not assist one of ordinary skill in obtaining the individual concentrations because they do not teach or suggest any information useful in furthering the teachings of Danielsson and overcoming its problems. As a result, Applicants respectfully submit that the Examiner has not proven a *prima facie* case of obviousness with the cited references and request that the rejection be withdrawn.

Involving Doyle. The Examiner rejects claims 3, 14-15, and 18-24 under 35 U.S.C. § 103(a) as obvious over Danielsson in view of Karlberg et al. and Ley and further in view of Doyle. The Doyle reference was published in the April 1999 issue of *Spectroscopy*. Applicants submit herewith a Declaration under 37 C.F.R. § 1.131 of Xin-Cheng Chai dated June 22, 2004 ("2004 Declaration"). The 2004 Declaration states that, on or before April 1, 1999, the Applicants had reduced to practice the invention as described and claimed in this application. Because this date is prior to the effective date of the Doyle article, Applicants submit that the reference is not available as prior art under 35 U.S.C. § 103(a) and respectfully request that this rejection be withdrawn.

Conclusion

In view of the foregoing amendments and remarks, Applicants respectfully request the reconsideration and the continued examination of this application and the timely allowance of the pending claims. In the event that these amendments and remarks do not place the pending claims in condition for allowance, Applicants respectfully request that the Examiner contact the undersigned to discuss the further prosecution of this application.

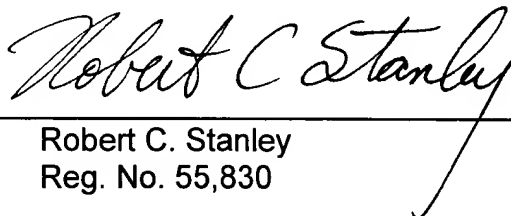
Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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Dated: June 23, 2004

By:



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